

**CLAIMS**

1. Polymer mixture comprising a polymer which is transparent at a wavelength greater than 300 nm and poly(9,9-XY-fluorene), wherein X and Y are each separately a straight or branched saturated or  
5 unsaturated C<sub>1</sub>-C<sub>12</sub> hydrocarbon chain and the said poly(9,9-XY-fluorene) is substantially dispersed as isolated chains, having an isolated chain density within the said transparent polymer of not more than  $1 \times 10^{19} \text{ cm}^{-3}$ .
2. Mixture according to Claim 1, wherein the said density of isolated  
10 chains in the said transparent polymer lies within the range from about  $1 \times 10^{17}$  to about  $8 \times 10^{18} \text{ cm}^{-3}$ .
3. Mixture according to Claim 2, wherein the said density of isolated chains in the said transparent polymer is about  $5 \times 10^{18} \text{ cm}^{-3}$ .
4. Mixture according to any of Claims 1 – 3, wherein X and Y are  
15 independently of each other a straight saturated C<sub>1</sub> – C<sub>12</sub> chain.
5. Mixture according to Claim 4, wherein X and Y are independently of each other a straight saturated C<sub>6</sub> – C<sub>9</sub> chain.
6. Mixture according to Claim 5, wherein X and Y are two identical alkyl chains.
- 20 7. Mixture according to Claim 6, wherein X and Y are identical, and are octyl chains.
8. Mixture according to any of the preceding claims wherein the said transparent polymer transmits light within a range from 300 nm to 900 nm.
- 25 9. Mixture according to Claim 8, wherein the transmission range of the

transparent polymer is from 320 to 750 nm.

10. Mixture according to any of claims from 1 to 7, wherein the transparent polymer is selected from the group comprising polymethylmethacrylate, polystyrene, polycarbonate.

5 11. Mixture according to Claim 10, wherein the transparent polymer is polymethylmethacrylate.

12. Process for the preparation of a mixture according to any of claims from 1 to 11, comprising the steps of:

- a) mixing a polymer which is transparent at a wavelength of at least 300  
10 nm, poly(9,9-XY-fluorene) and an inert solvent, and  
b) removing the solvent,

where X and Y are independently of each other a straight or branched saturated or unsaturated C<sub>1</sub> – C<sub>12</sub> hydrocarbon chain.

13. Process according to Claim 12, wherein step a) takes place at room  
15 temperature and pressure.

14. Process according to Claim 12 or 13, wherein the step of mixing between the said transparent polymer and the said poly(9,9-XY-fluorene) takes place in a ratio of 10 to 1.

15. Optically active solid material of the polymer mixture according to  
20 any of Claims 1 to 11.

16. Material according to Claim 15, in which the material is a polymer film.

17. Material according to Claim 15 or 16, in which the gain band is from 450 to 610 nm with a maximum gain of 2500 db/cm.

25 18. Use of the material according to any of claims from 15 to 17 as an

optical switch.

19. Use according to Claim 18, in which the material provides switching of the gain of 100 nm and a frequency of 300 GHz.